ParametricAnalysisTool (PAT) Version 1.4.0

August , 2014

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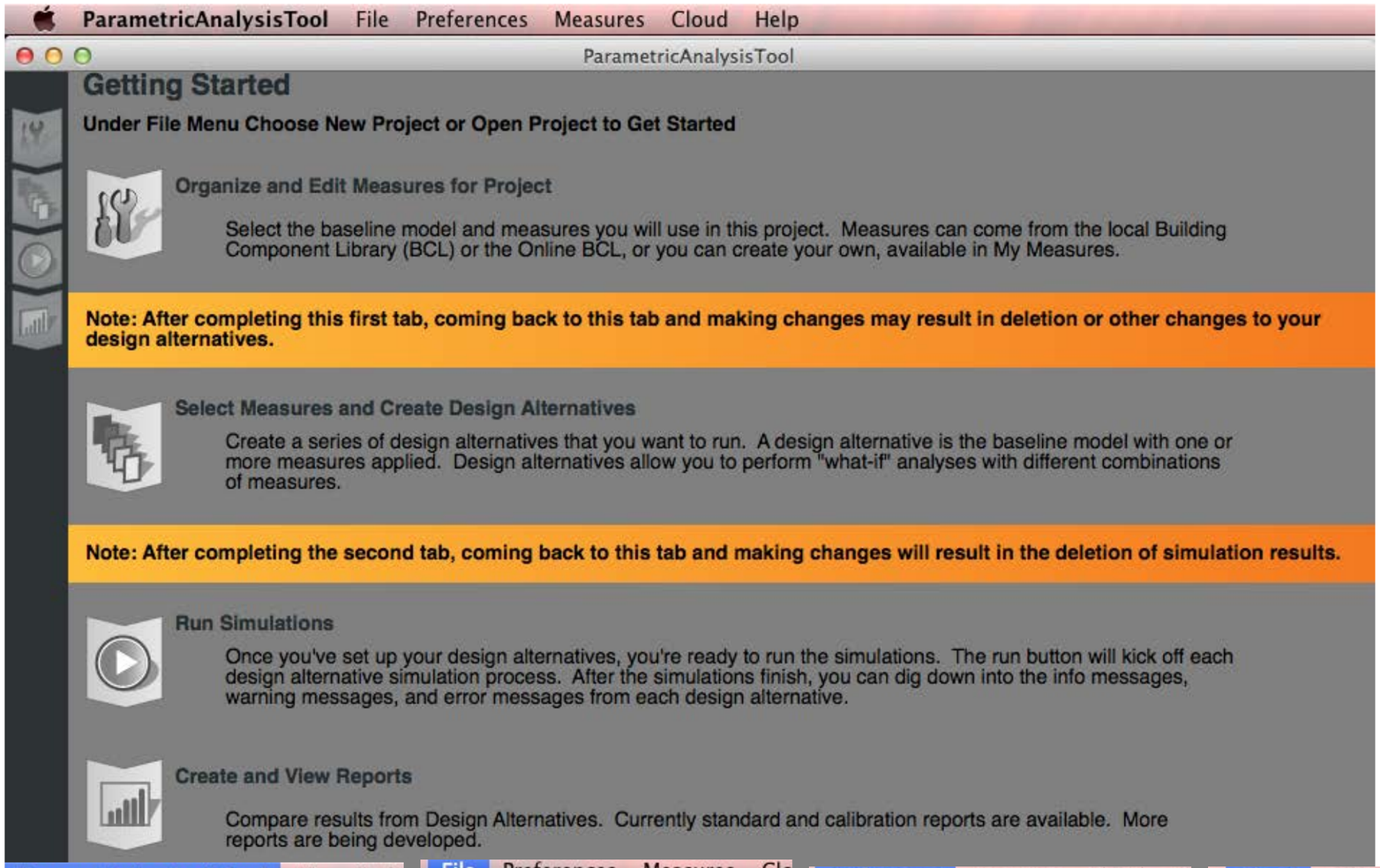
Starting Screen & Menus

The first screen of the interface provides some guidance on the PAT workflow.

Start by creating a new project under the "*File*" menu or opening an existing project.

Move through the four tabs on the left to

- Organize your measures
- Create design alternatives
- Run simulations
- View results



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Organize & Edit Measures for Project 1

Download measures from The *Building Component Library (BCL)*. Drag measures from the library to the central panel.

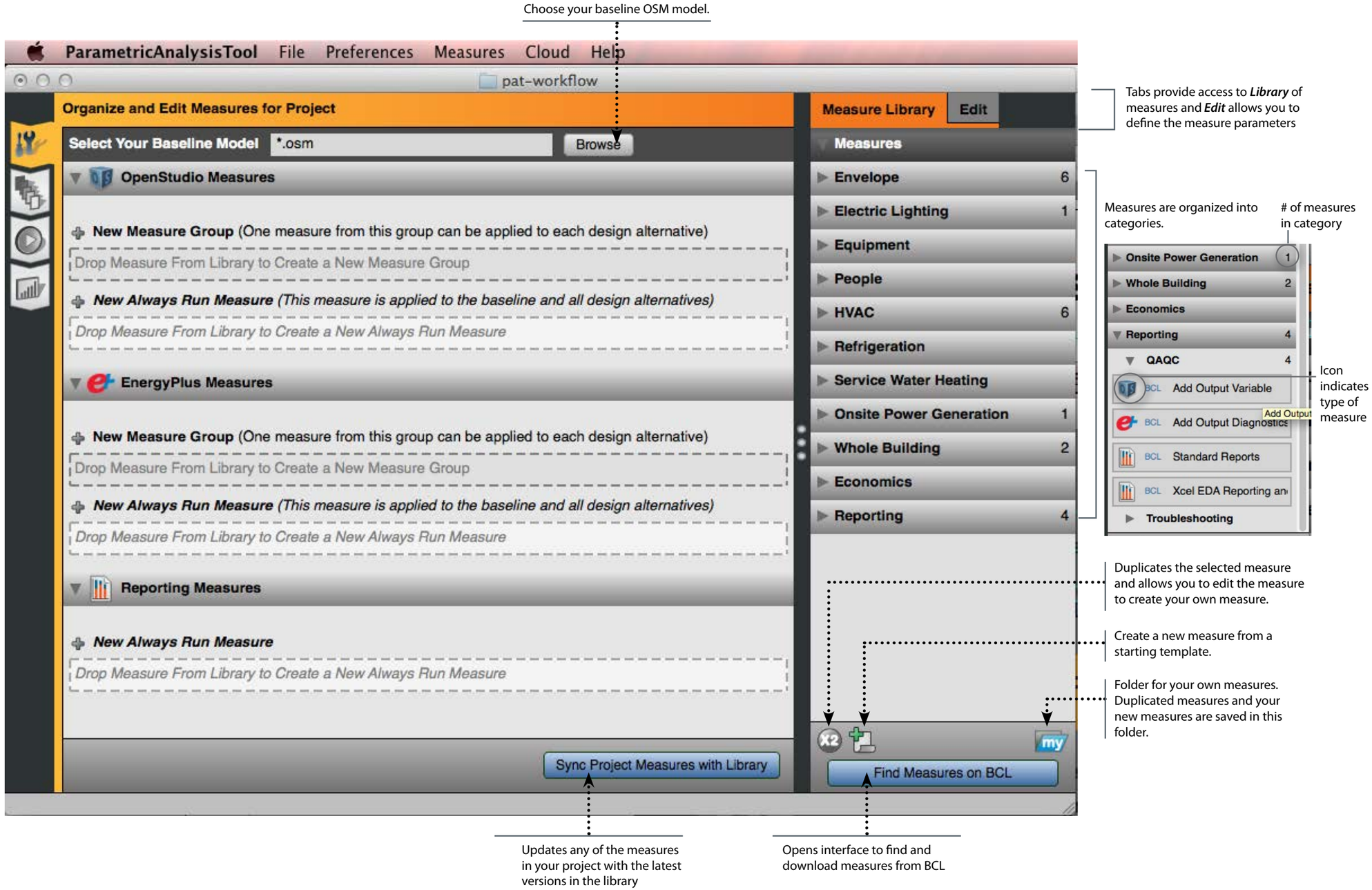
There are three types of measures:

- **OpenStudio Measures** are run on the OSM model before it is converted to an IDF.
- **EnergyPlus Measures** can be run on the IDF file before it is handed to EnergyPlus.
- **Reporting measures** produce reports to chart results, provide quality assurance, and quality control on models.

"*Measure Groups*" usually contain one type of measure with different parameters, because only one measure from a measure group can be applied to each design alternative.

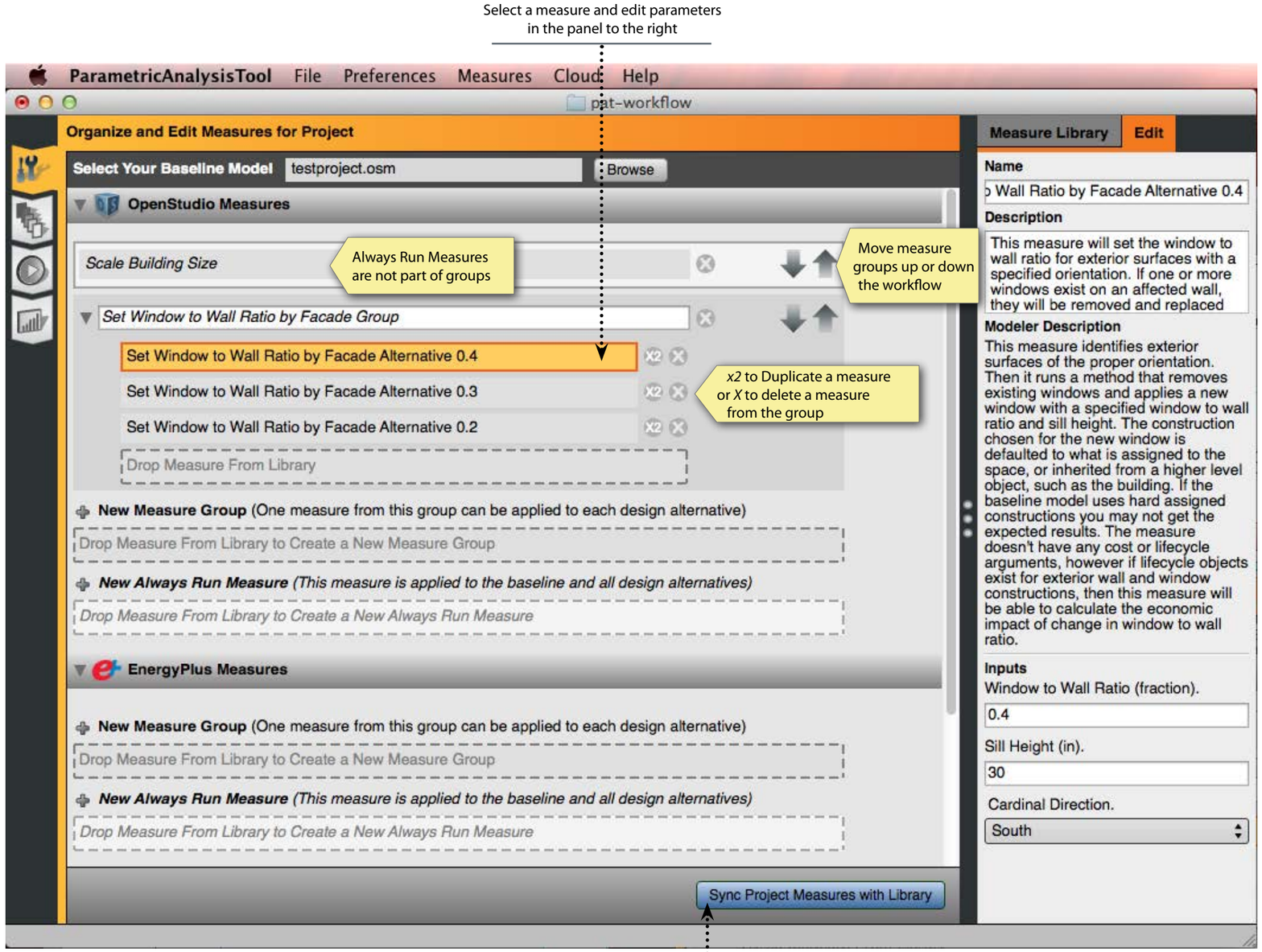
"*Always Run Measures*" will be applied to all design alternatives created from the baseline model.

Check out the *Measure Writing Guide* on the *OpenStudio Website* and start writing your own custom measures.



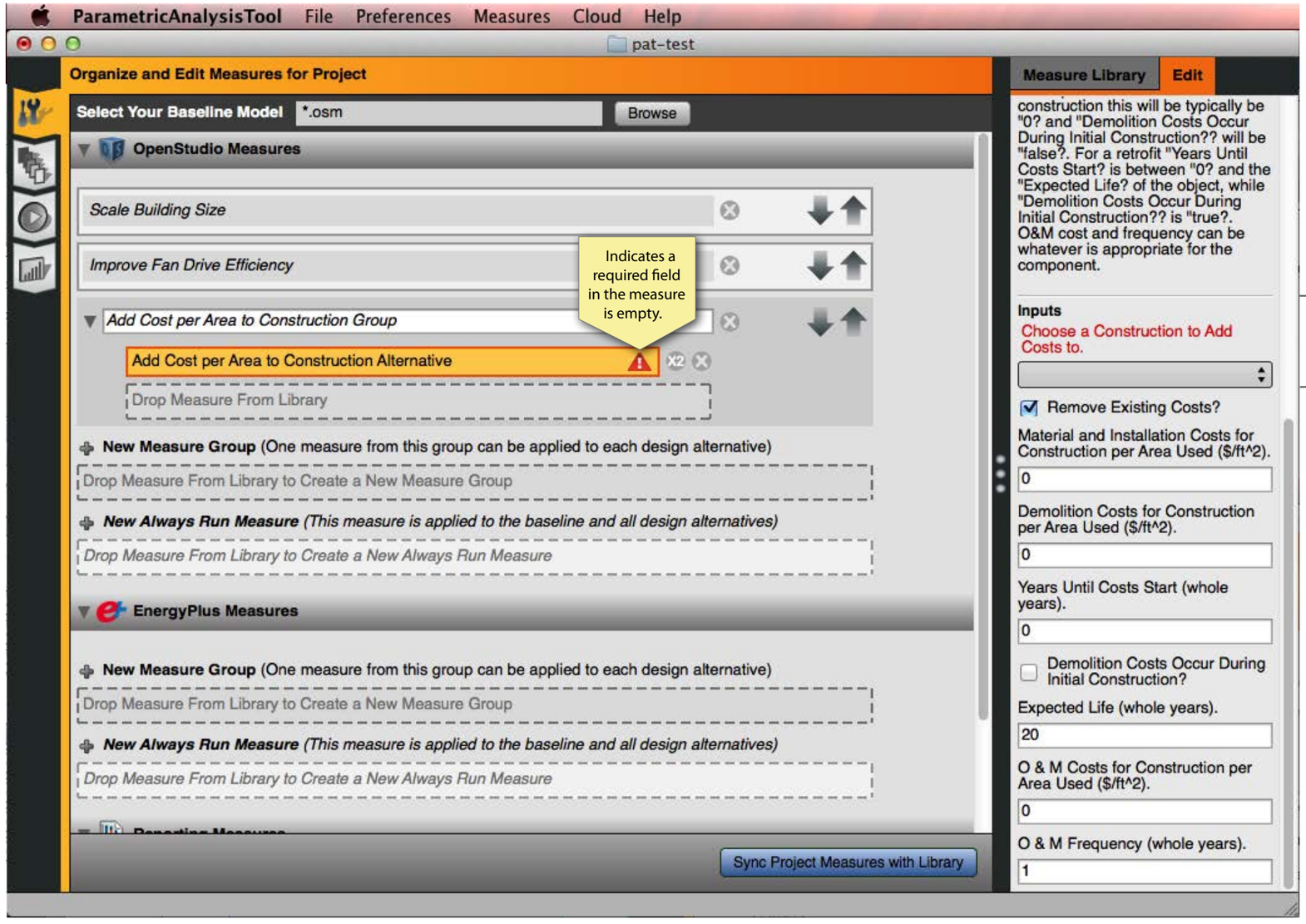
Organize & Edit Measures for Project 2

By selecting the measure and selecting the right "*Edit*" tab, inputs for the measure can be entered and adjusted.



Organize & Edit Measures for Project 4: Warnings

A red warning triangle and will show up beside your measure if required fields are not complete. Select the measure and complete the fields in the "*Edit*" panel on the right.



Red text indicates the required field that needs to be completed

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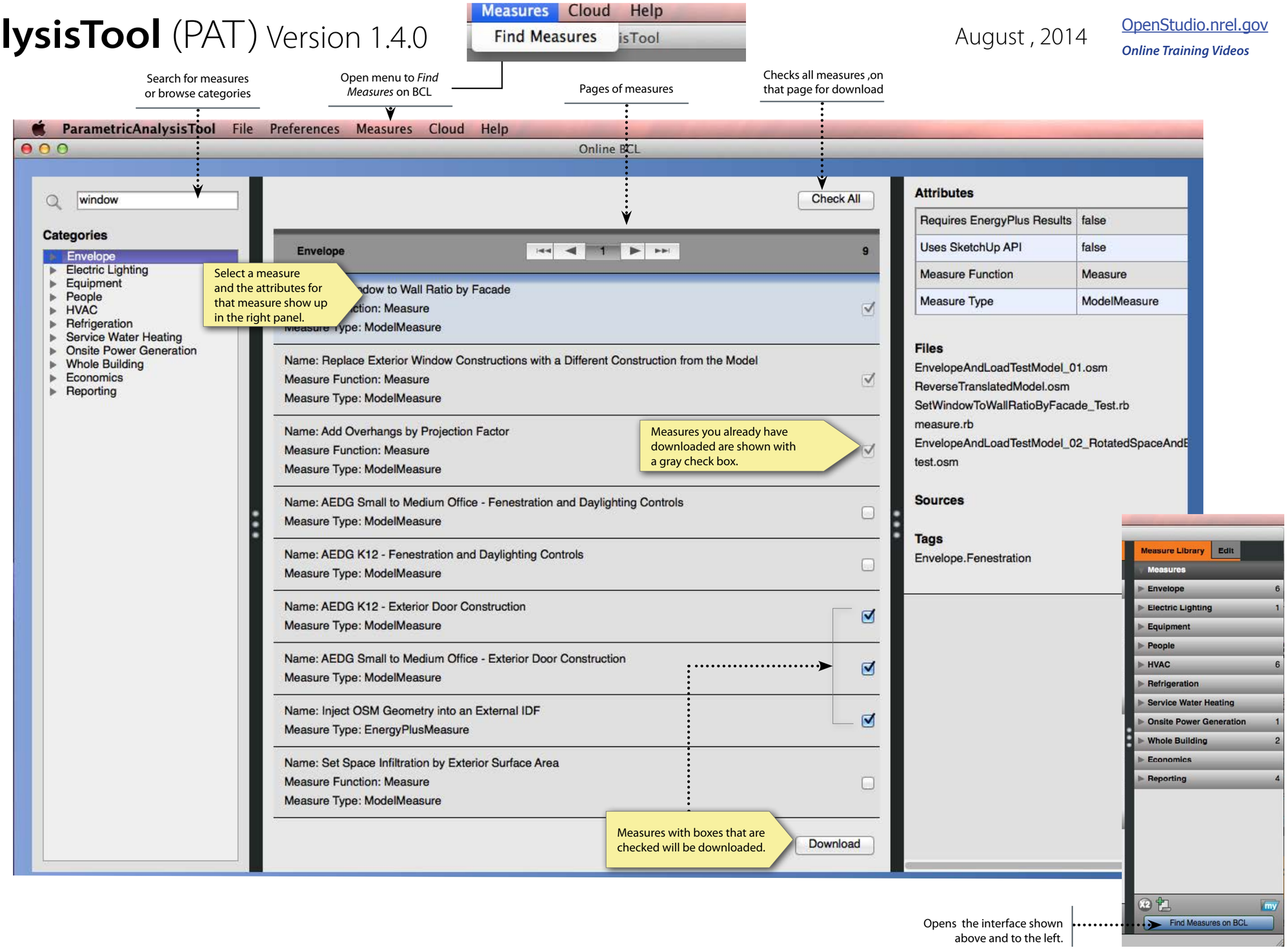
Organize & Edit Measures for Project 3: BCL

From the "*Measures*" menu and *"Find Measures"* along the top or the *"Find Measures on BCL"* button at the bottom of the "*Library*" you can access the BCL.

Search for specific measures or browse through the categories.

The "*Check All*" button can be used to select all the measures on a page view. If you already have a measure in your library the check box will be grayed out and checked.

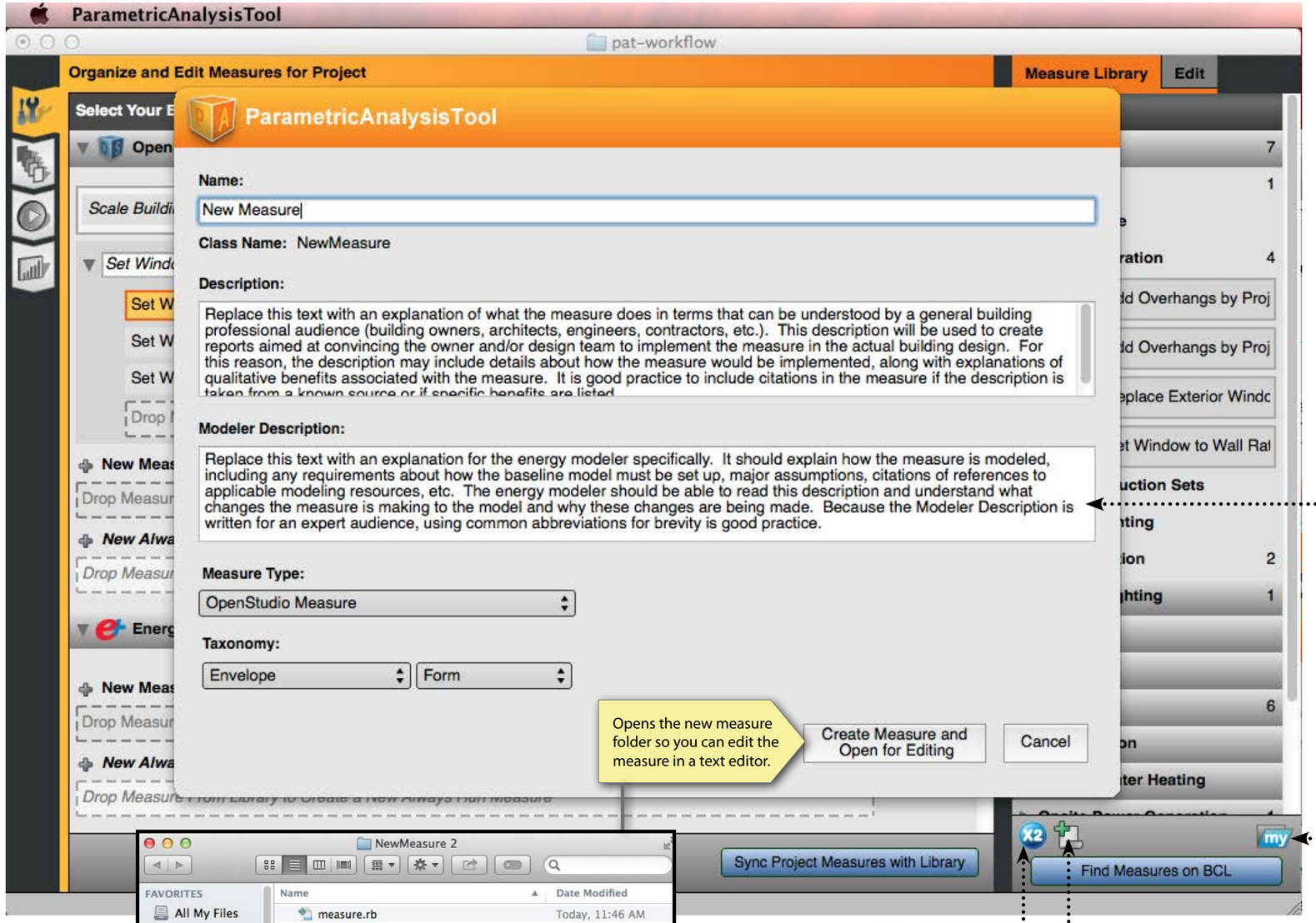


Organize & Edit Measures for Project 5: New Measure

Hit the "*New Measure*" icon to open a dialog to create your own measure. Write a descriptive title, more detailed descriptions, and select the measure type and taxonomy.

Duplicating a measure opens up a similar dialog, but the name of the measure will have "*copy*" added at the end.

The *Measure Writing Guide* on the OpenStudio website will guide you through this process and provide best practices.



Select Measures & Create Design Alternatives 1

This tab allows you to create design alternatives from the measures you put into your project on the first tab.

The left panel provides a list of available OpenStudio measure groups and measures.

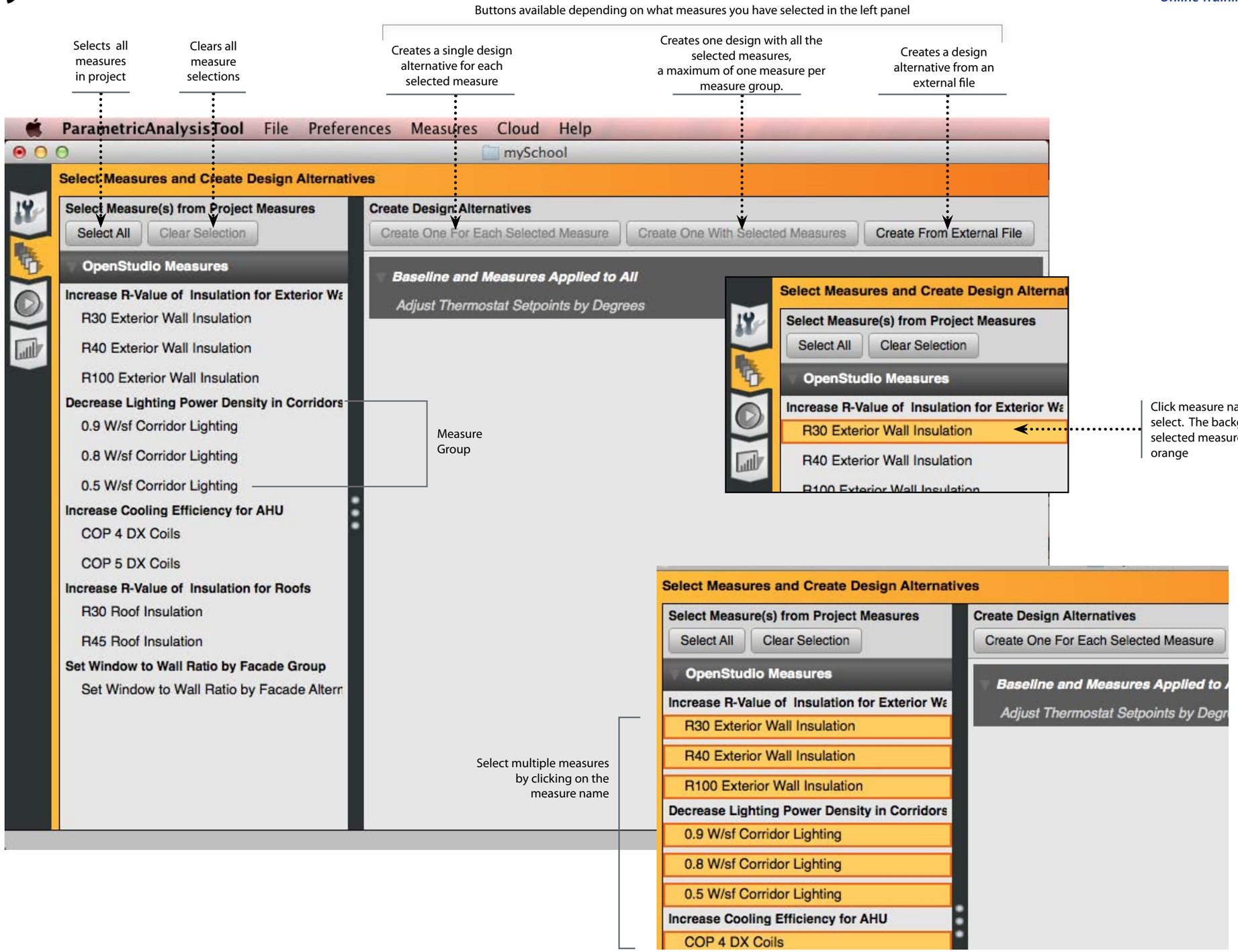
A maximum of one measure from a group can be applied to a single design alternative. But you can apply measures from different groups on a single model.

Select the measures you want to apply by clicking on the measure name. Depending on what measures you select the buttons on the right top panel will create the alternative.

You can create one design alternative for each measure selected with the "*Create One For Each Selected Measure*."

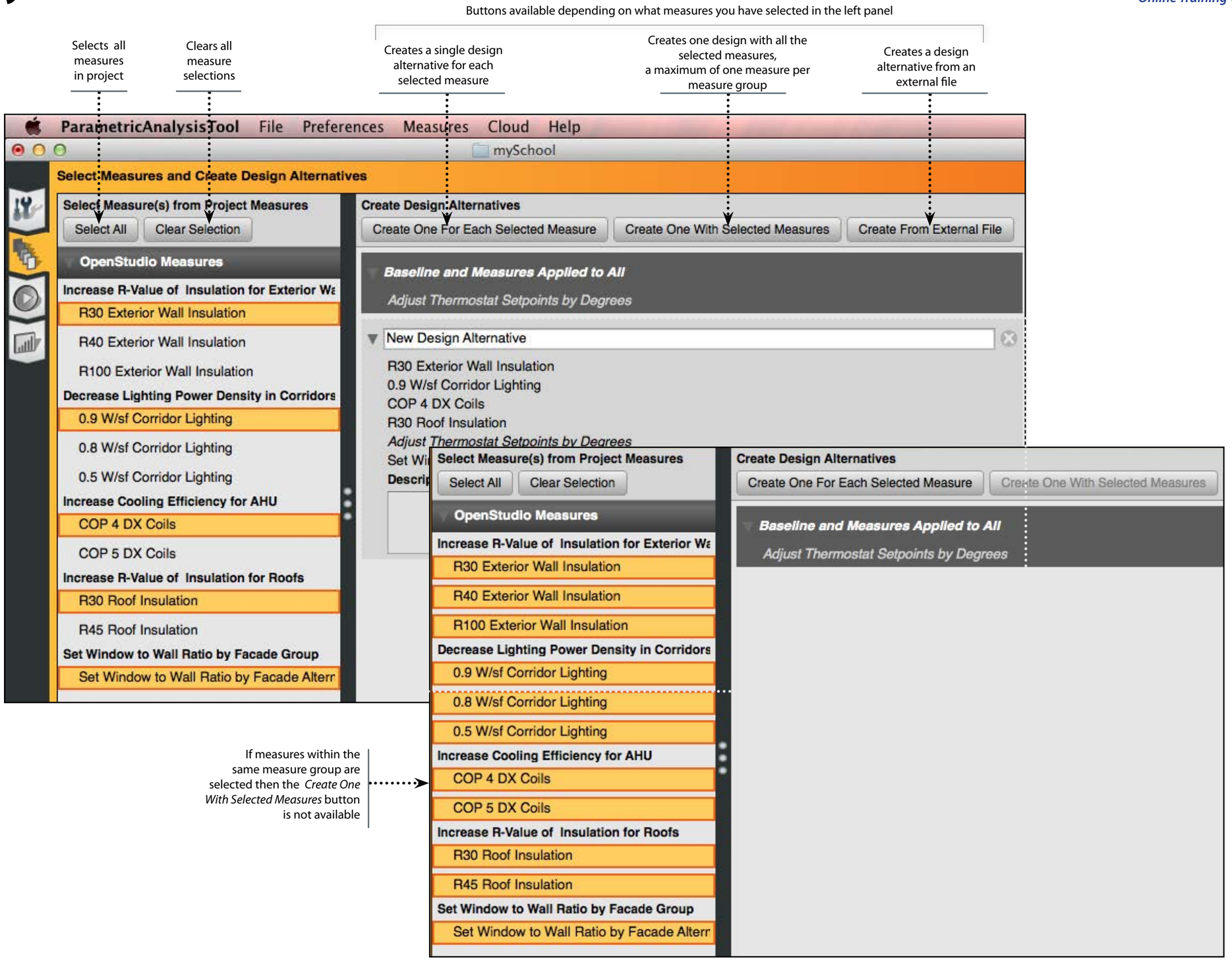
To create one design alternative with many measures applied, select the measures and hit "*Create One With Selected Measures*."

If you want to bring in an external model to compare as an alternative use the "Create From External File" button.



Select Measures & Create Design Alternatives 2

The examples to the right show how your measure selections determine what buttons are available for creating design alternatives.

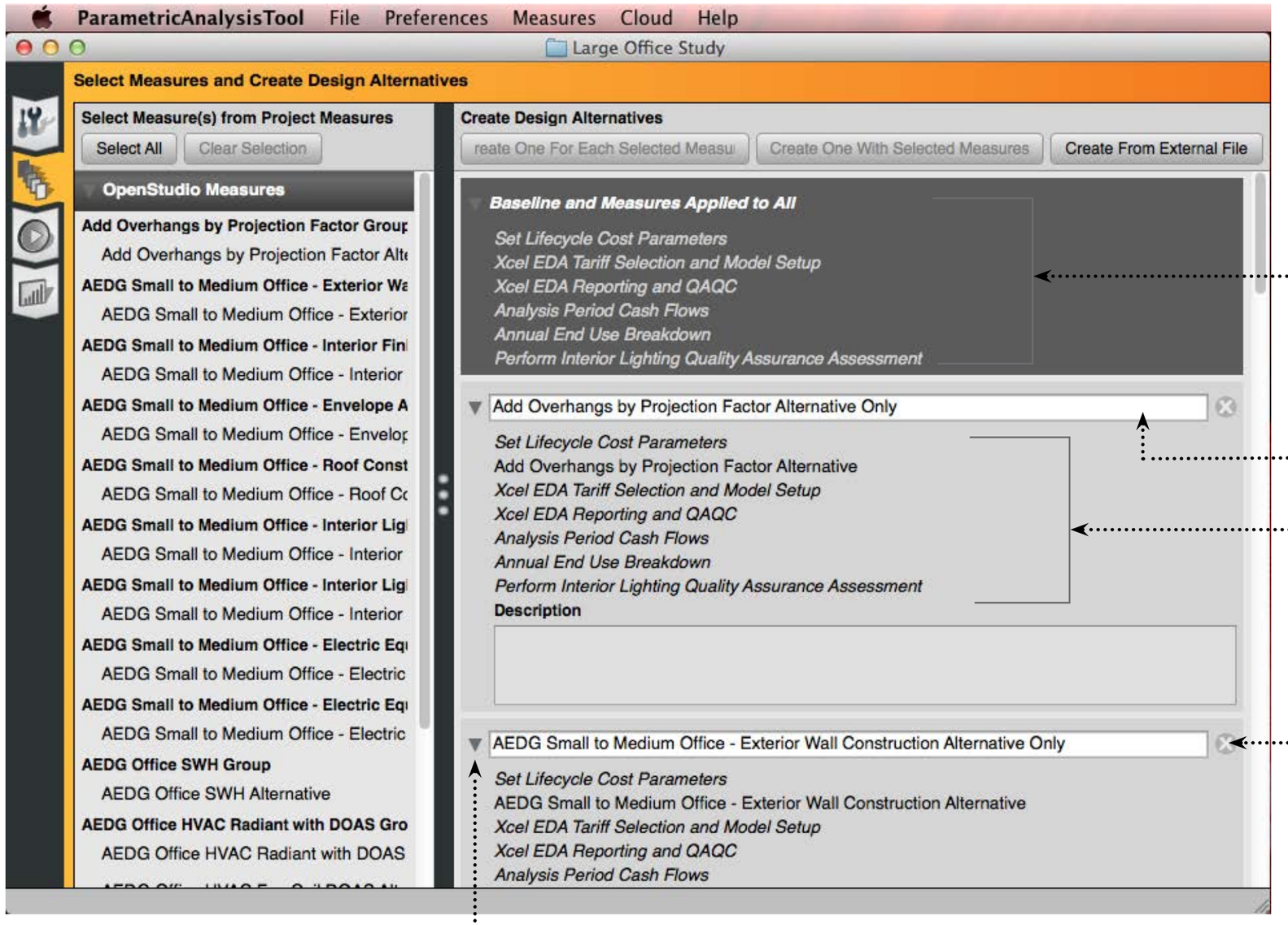


Select Measures & Create Design Alternatives 1

Once you create design alternatives, they appear in the right panel. The name of the alternative can be edited. The measures applied to each alternative are viewable by expanding the view.

The baseline model always appears at the top of the right panel with a dark gray background. The "*Always Run*" measures are listed under the baseline and are run on all design alternatives.

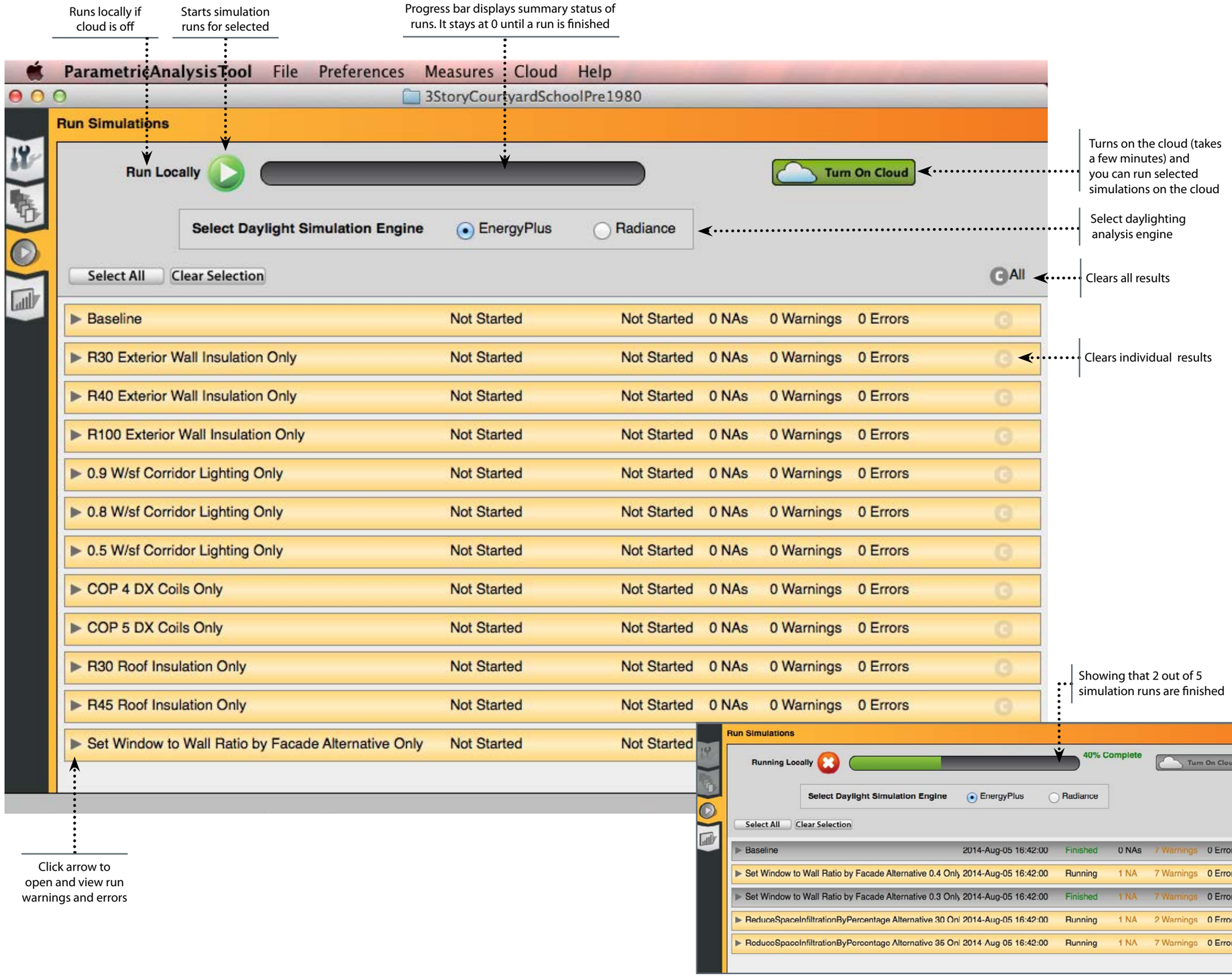
Design alternatives can be removed by hitting the delete button.



Run Simulations Locally

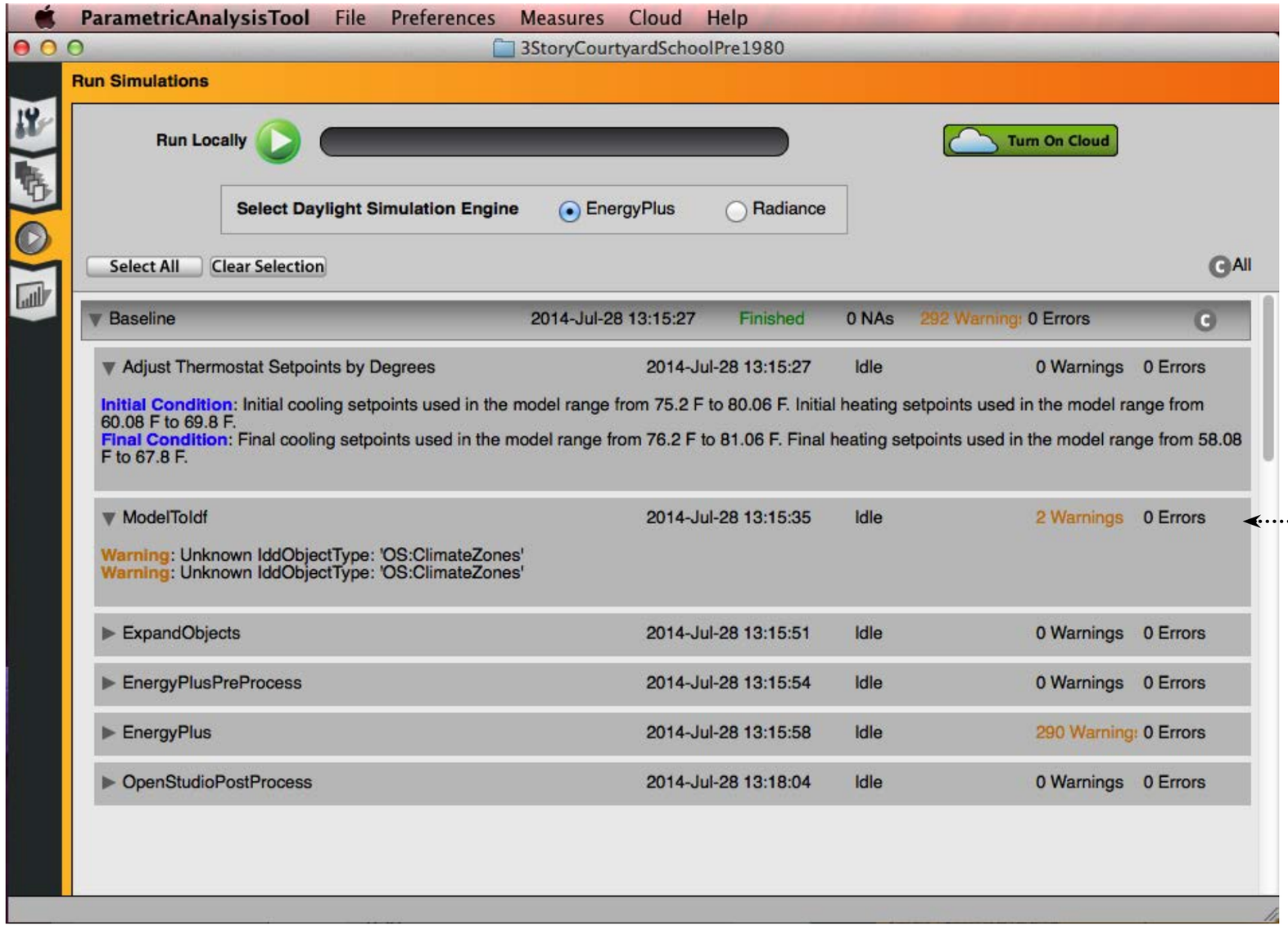
Select the design alternative you want to run. Selected alternatives turn the yellow-orange. Hit the run button to start the simulations.

If you want to run a daylighting analysis with Radiance select that option here.



View Locally Run Results

Warnings and errors can be viewed by expanding the baseline or alternative.



Running on the Cloud: Settings 1

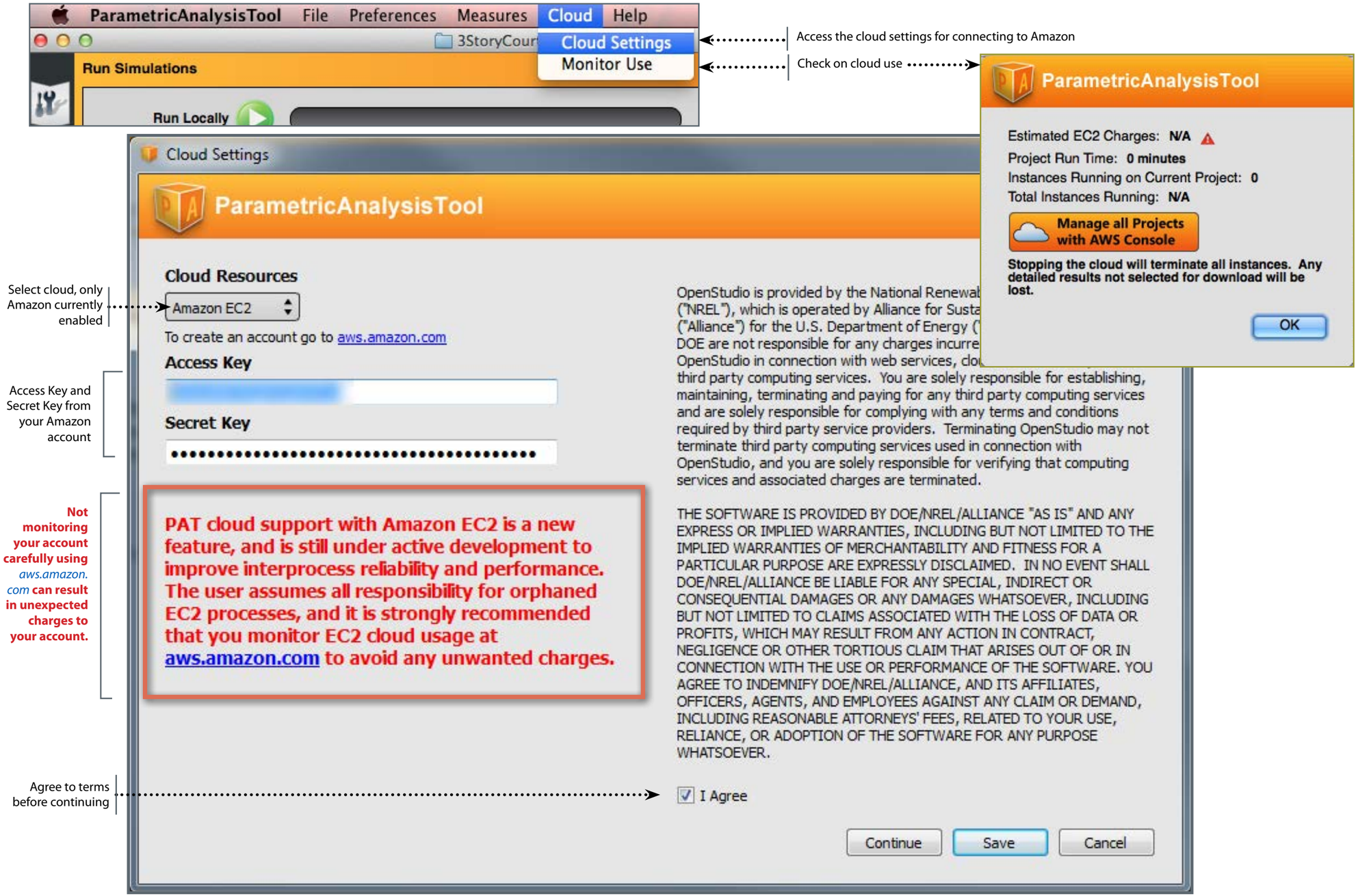
Before you click the "Turn on Cloud" button, fill out the *Cloud Settings* dialogs from the *Cloud* menu.

Add information on your Amazon EC2 account and agree to the terms on the first screen.

Currently only Amazon EC2 is available through PAT.

The "Monitor Use" dialog under the *Cloud* menu will show you how many instances you have in your current project as well as other projects. If your "Total Instances Running" is more than 0, and you don't know why, you can go to the EC2 Console website to terminate them. The "Estimated EC2 Charges" value is directly from Amazon, but may be up to 24 hours delayed. As a result you won't see this change on the fly as you are working on a project, you will typically see it the next day.

Learn more about using Amazon cloud at *aws.amazon.com.*

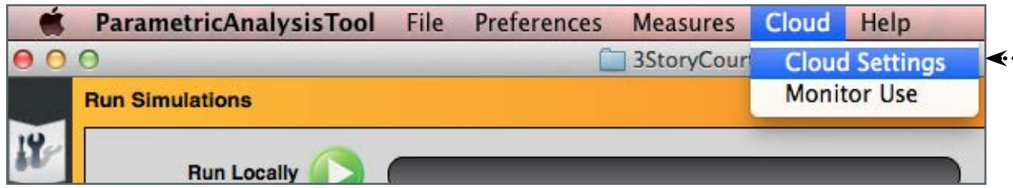


Running on the Cloud: Settings 2

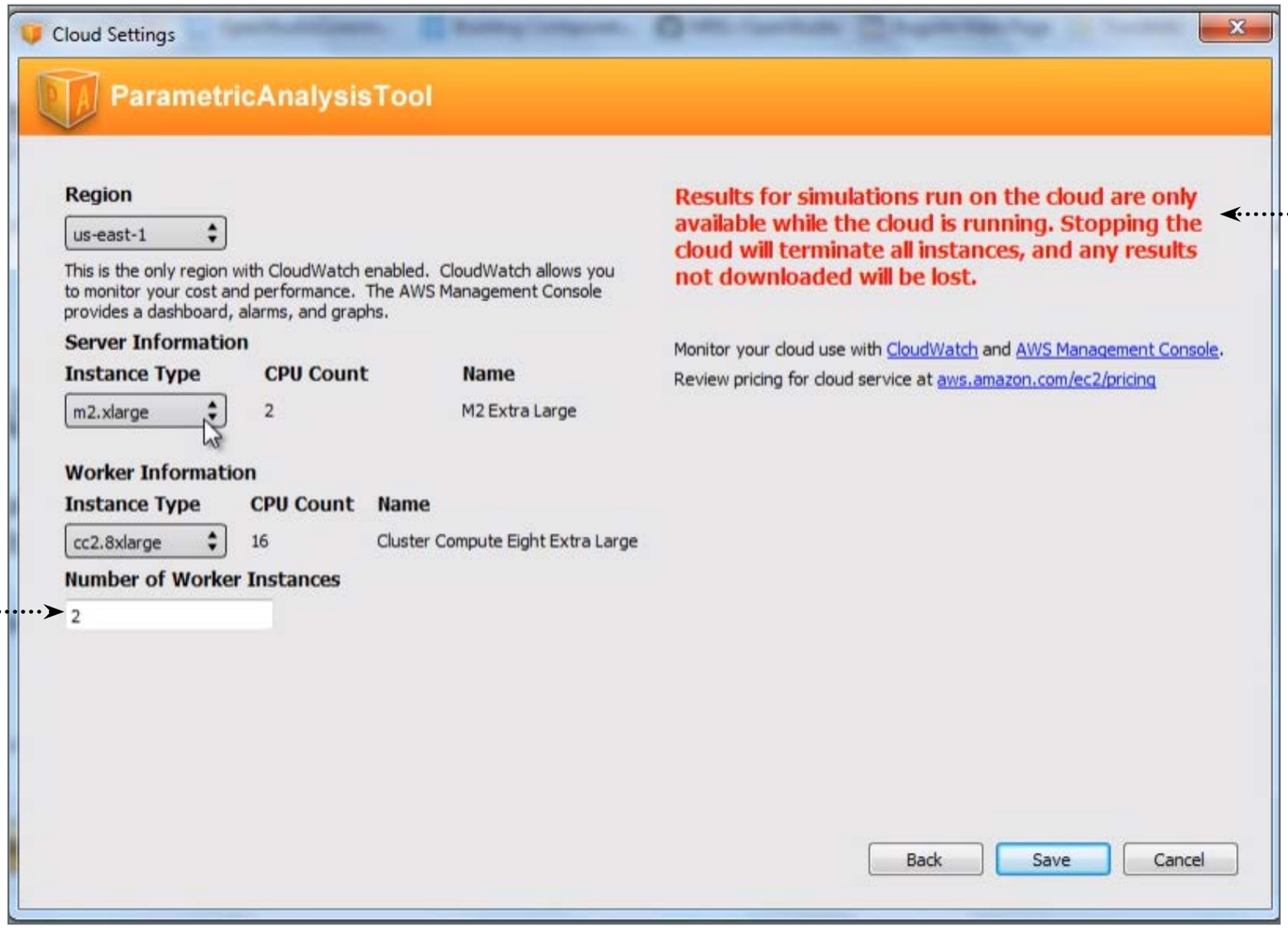
On the second screen of the "Cloud Settings" dialog, confirm that you have chosen the desired sever, worker, and number of workers.

As soon as you hit the "Turn on Cloud" button you will start incurring charges, and the smallest increment is one hour. If you have to cancel and re-start it you will be charged again.

Review pricing at ***http://aws.amazon.com/ec2/pricing/***



Access the cloud settings for connecting to Amazon



Download the results you need before terminating the cloud connection

Determines how many simulations can be run, but also increases the fees per hour

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Running Simulations on the Cloud

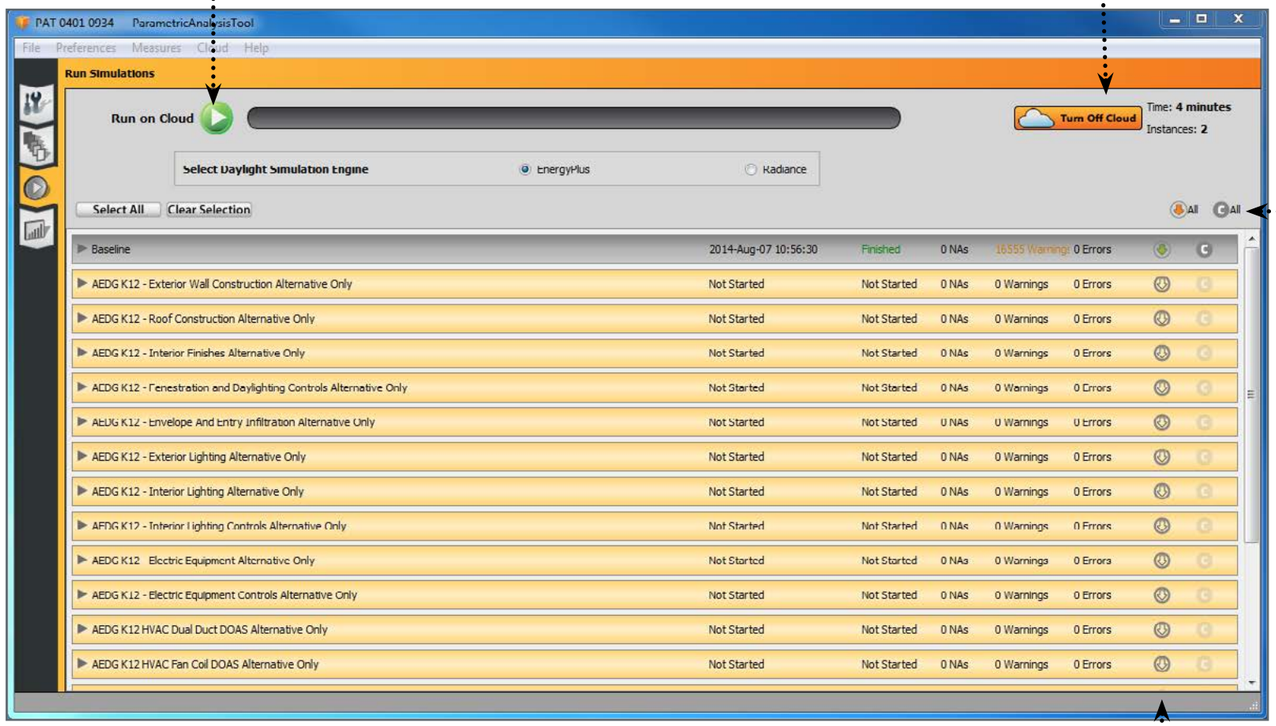
Select your baseline model, then run locally before you start the cloud to confirm that it is valid and will run properly. To do this you can deselect all other design alternatives, and then select just the baseline.

Before you click the "*Run on Cloud*" button, make sure you have selected all of the design alternatives that you want to run. Choosing "*Select All*" will select all jobs that have not already been run locally, or on a previous cloud session.

Quitting PAT while the cloud is on will not close the EC2 instances. If you Launch PAT again but open a different project it may look like the cloud is off, but that is only relevant for that current project.

To properly end the cloud session in PAT re-open the PAT project (if you have closed it) and then click the button to stop the cloud. For a few minutes you will see "*Stopping Cloud*.

Once you stop the cloud you will no longer be able to download detailed simulation results. If this happens and you want to get one, you can always run that job locally. It is generally not recommended to download detailed results for all design alternatives, as that will use a lot of hard drive space and network bandwidth.

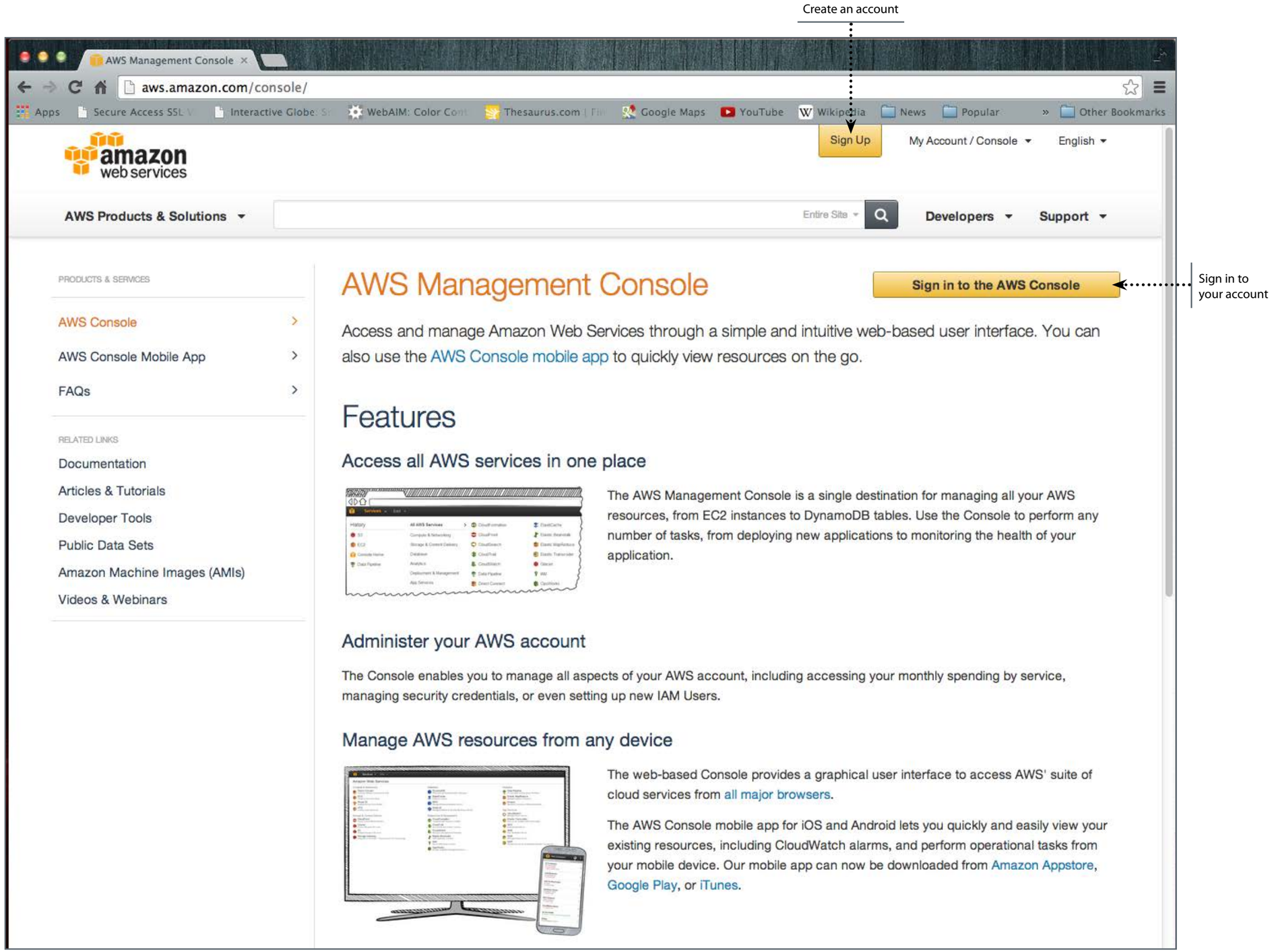


Detailed results contain the all timeseries SQL results generated by EnergyPlus.

Regular results contains information generated by OpenStudio Reporting measures as well as some additional high level results.

AWS Management Console

It is always a good idea to go to the EC2 website to confirm that the instances have shut down. To view your EC2 web console, click the "*Manage all Projects with AWS Console*" in the "*Monitor Use*" dialog or "*AWS Management Console*" in the "*Cloud Settings*" dialog. It will take you to this address ***(http://aws.amazon.com/console/).*** Once there click "Sign in to the AWS Console"



AWS Management Console

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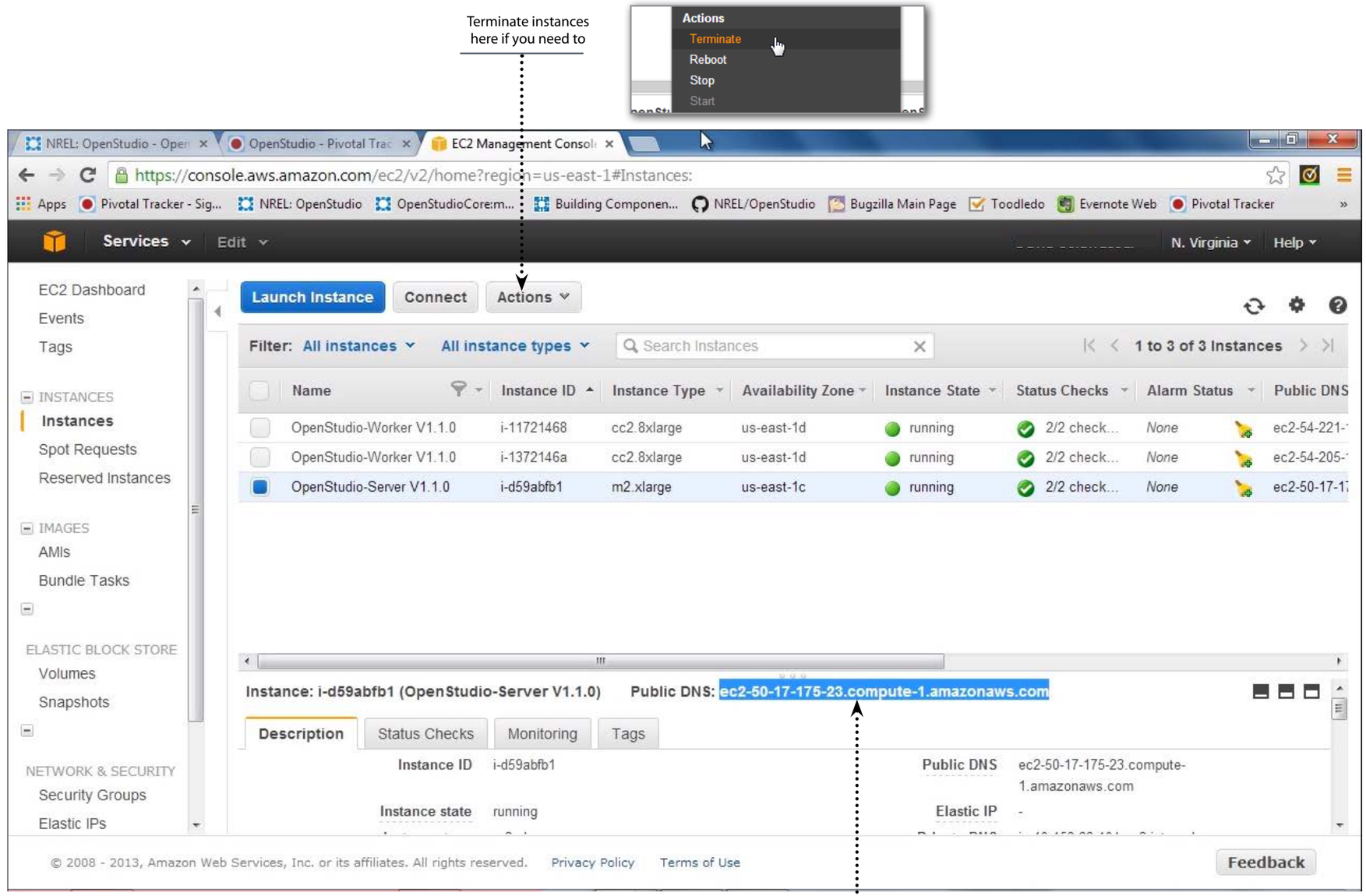
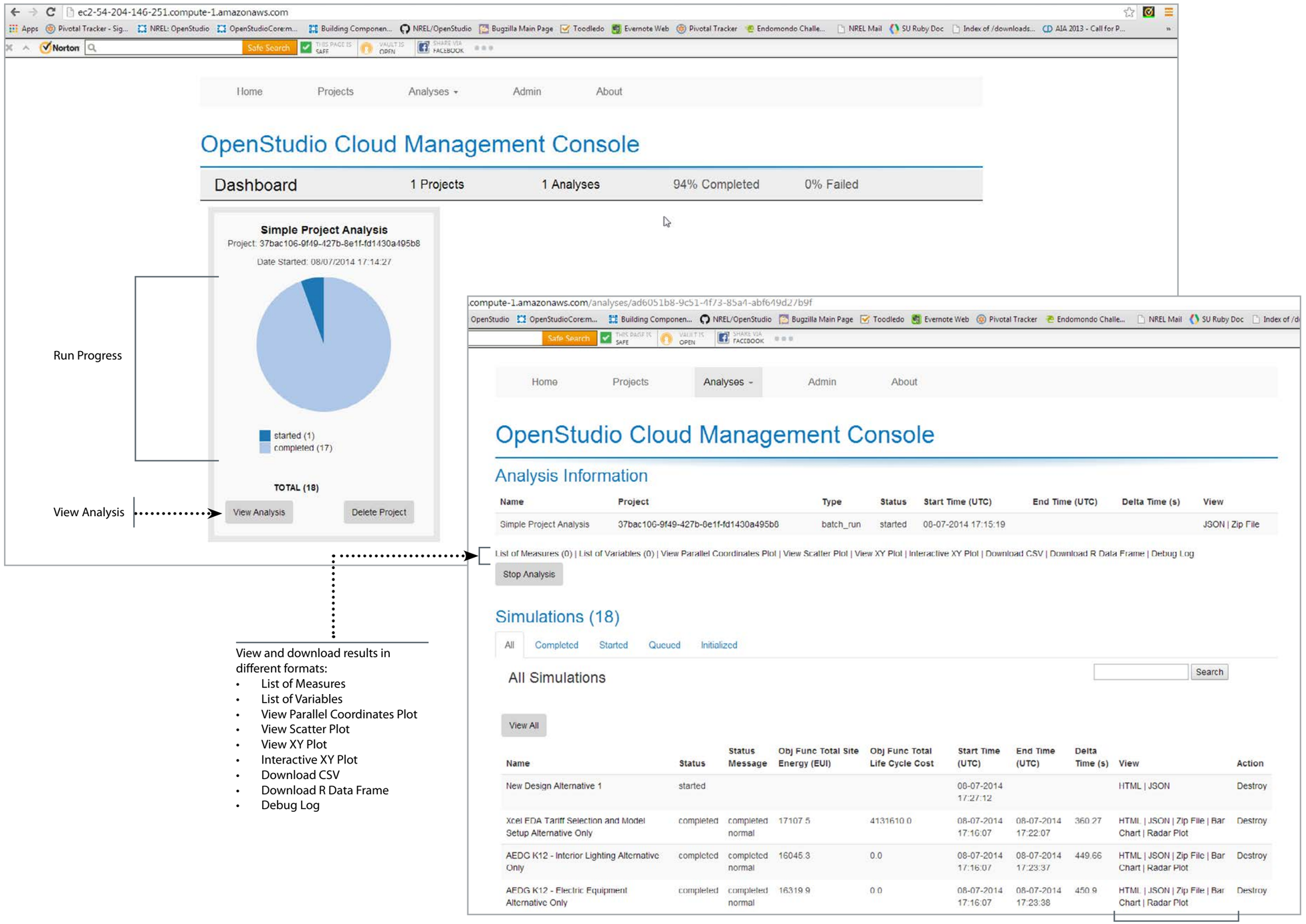


OpenStudio Cloud Management Console

OpenStudio Cloud Management Console



View and download results in different formats:

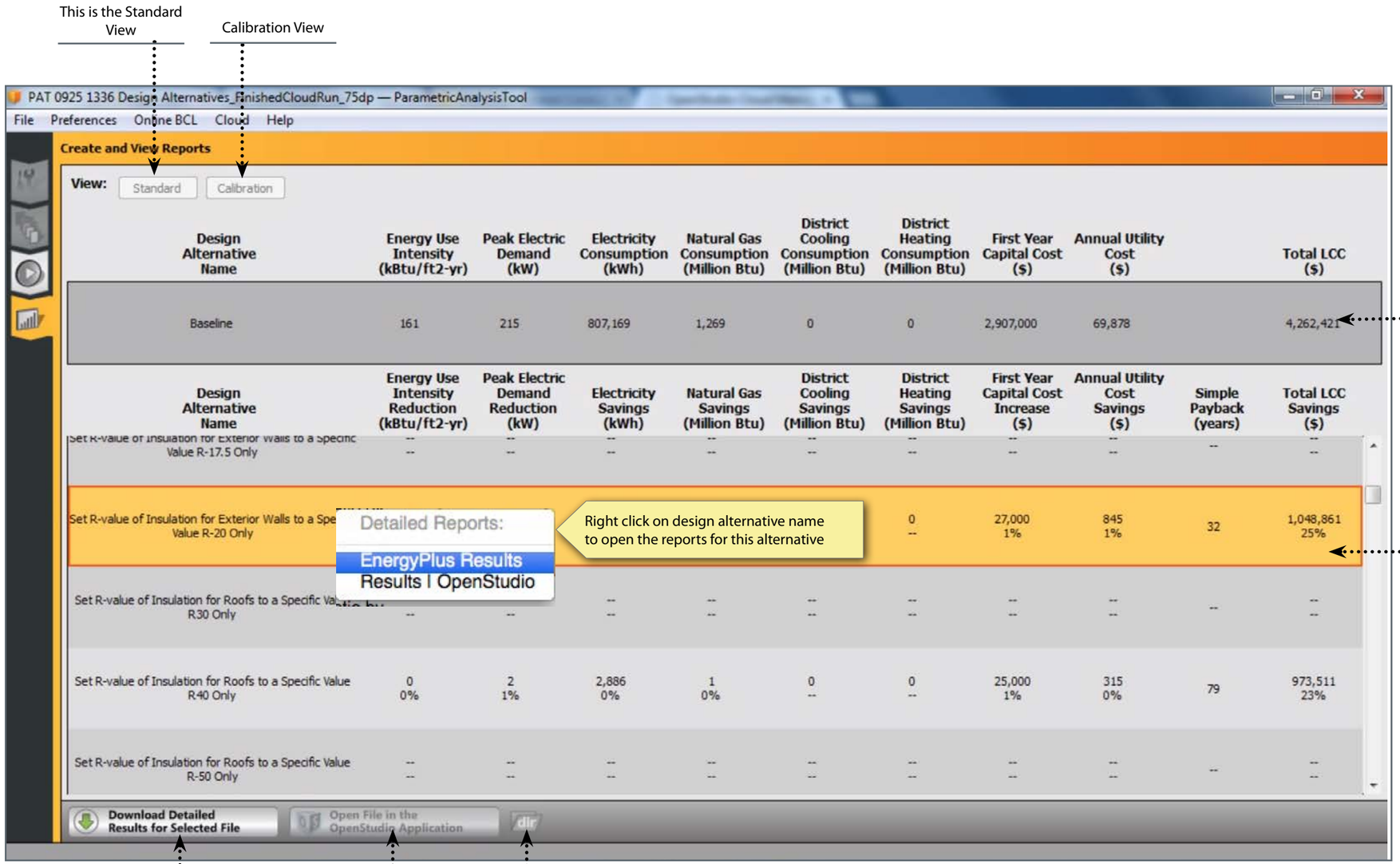
- List of Measures
- List of Variables
- View Parallel Coordinates Plot
- View Scatter Plot
- View XY Plot
- Interactive XY Plot
- Download CSV
- Download R Data Frame
- Debug Log

View and download individual results in different formats

Results — Standard

While your project is running on the cloud you can choose the design alternative and select "*Download Detailed Results for Selected File*" if you want more detailed data on some of the options.

Right click on a design alternative to view the EnergyPlus or OpenStudio Results.

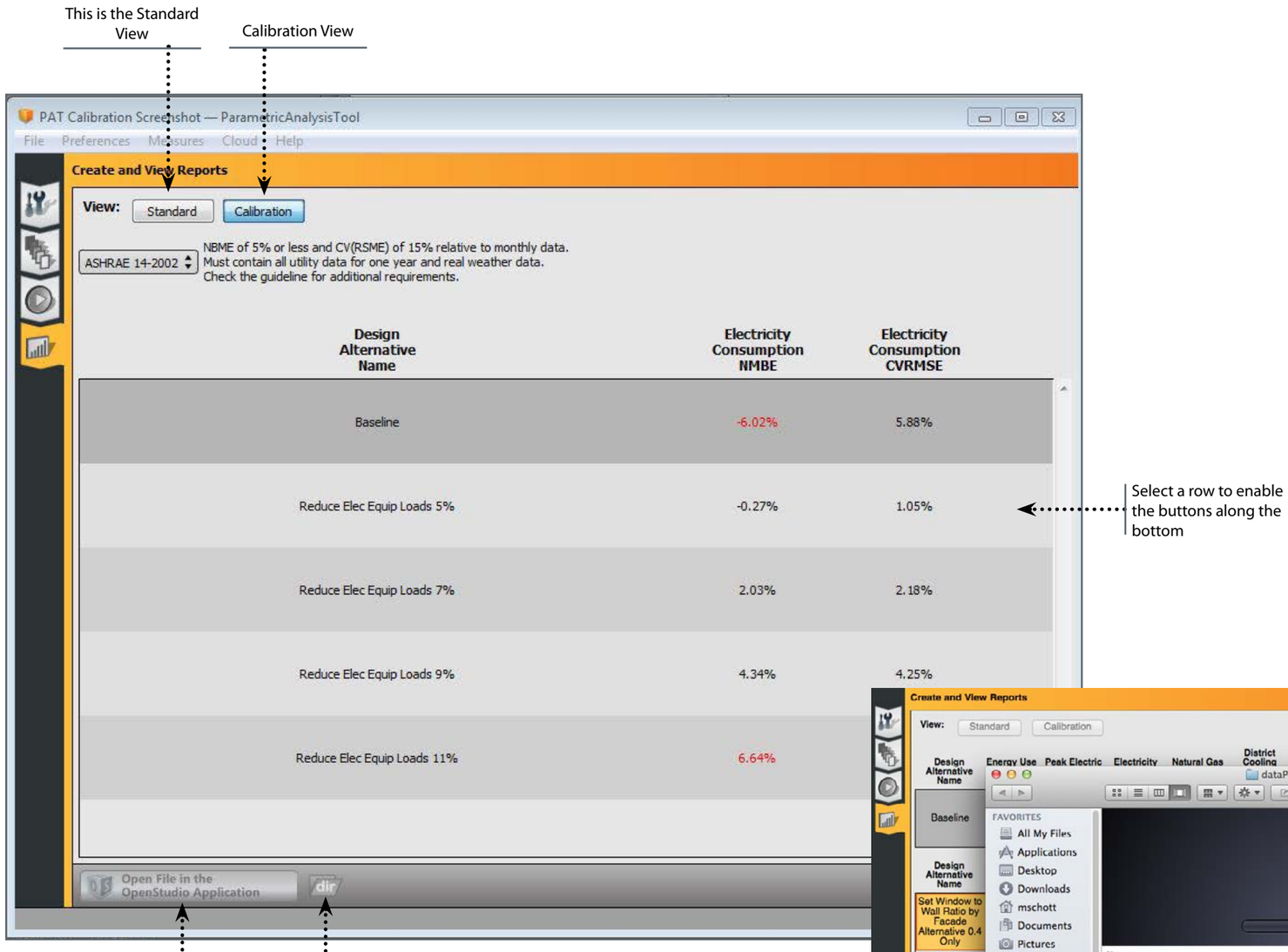


Results — Calibration

To calibrate to the ASHRAE 14-2002 or FEMP standard the baseline model must contain all utility data for one year and real weather data. Check the guidelines for additional requirements.

By selecting the "*Calibration*" report you can compare the model and actual utility bills.

The report provides ASHRAE 14-2002 calibration standard and the FEMP calibration standard options.



Results — Opening HTML Files from Directory

You can open htm report files in your browser. EnergyPlus and standard and calibration OpenStudio reports can be found by right clicking on a design alternative, on the Results tab, and selecting the results you want to view.

	1	2	3	4	5	6	7	8	9	10	11	12
Start	1/1	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1	11/1	12/1
End	1/31	2/28	3/31	4/30	5/31	6/30	7/31	8/31	9/30	10/31	11/30	12/31
Actual	210,000	195,000	210,000	203,000	210,000	203,000	210,000	210,000	203,000	210,000	203,000	210,000
Model	209,835	193,814	210,180	203,461	211,082	204,691	212,602	212,838	205,009	210,838	203,199	209,864
NMBE	-0.00%	-0.70%	0.09%	0.22%	0.52%	0.83%	1.25%	1.35%	0.99%	0.25%	0.09%	-0.02%